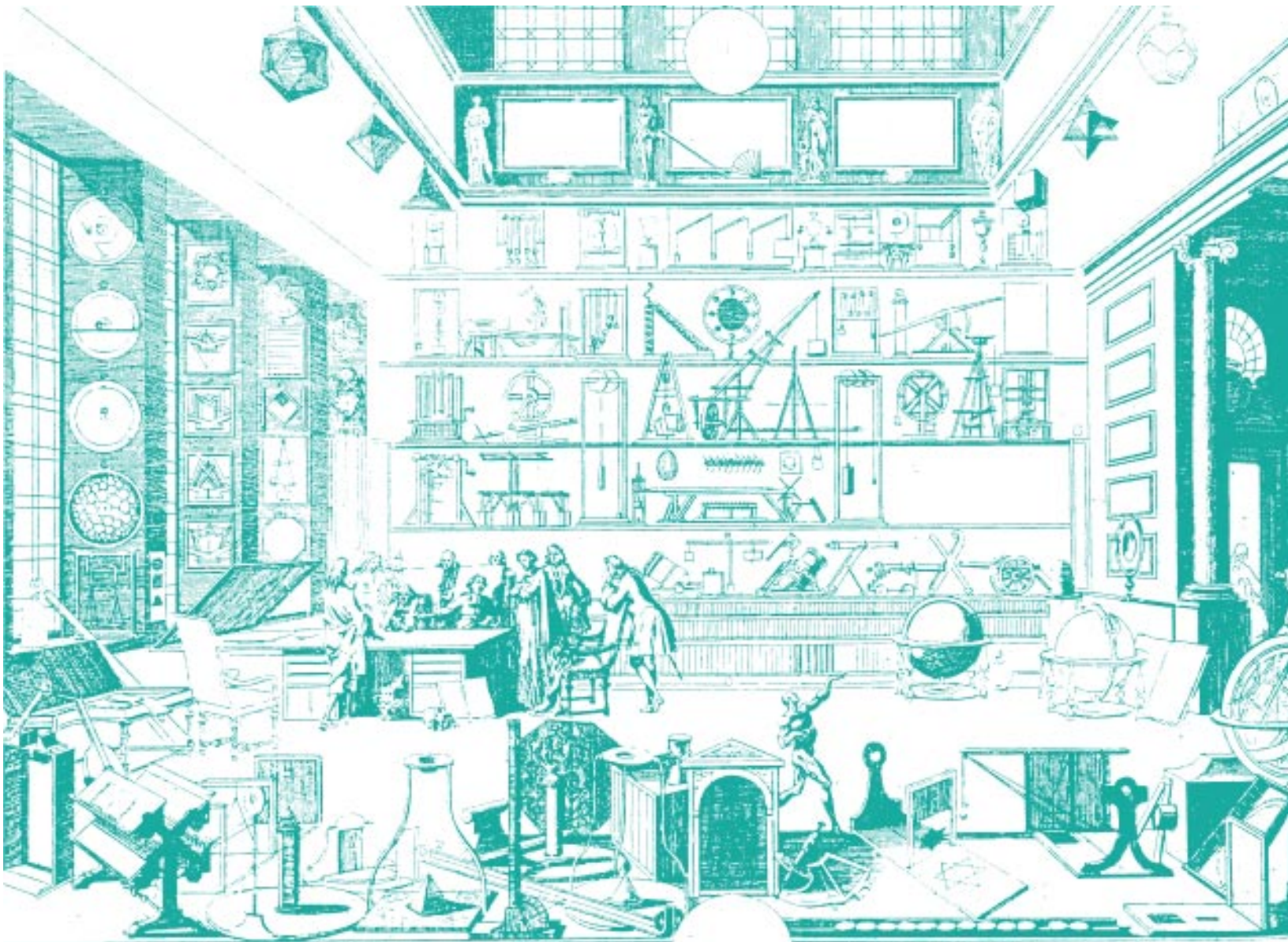


U.S. Army Research Laboratory

Fellows





The ARL Fellows are a very accomplished group. They represent the very best scientific and engineering talent at the Army's central research laboratory. The diversity of interests at ARL is well represented by the work of the Fellows, whose technical biographies are presented in this publication. I urge readers to examine the classical material reproduced in blue that accompanies each write-up. Interesting in itself, this material also reflects the variety of ARL's work.

Excellence in a research laboratory depends on high quality in the staff. ARL is proud of its staff and their many accomplishments over the years. The Fellows are recognized by ARL for having demonstrated excellence in technical work over prolonged periods and for exerting very positive influences on the rest of the staff. We look to the Fellows for a high standard of performance to which we can all aspire.

John W. Lyons
Director, ARL

U.S. Army Research Laboratory

The U.S. Army Research Laboratory provides America's soldiers the technology edge by conducting a broadly based, multidisciplinary program of basic and applied research, exploratory development, and analysis. The spectrum of its research spans a variety of technical disciplines, and it actively pursues technological advancements through direct in-house laboratory efforts as well as joint programs with government, industry, and academia. With a variety of extensive resources, ARL has the capability to remain at the cutting edge of technology. It has a diverse assortment of facilities with unique features that enable the conduct of highly advanced and specialized research. Its work force of nearly 1400 scientists and engineers constitutes the largest integrated source of readily available science and technology services in the Army.



Reproduced above are original notes made by Oersted in his own handwriting. It was from these and similar rough notes that modern electrical science and engineering grew. The house shown contained Oersted's laboratory in Copenhagen. The compass is the original one used by him in his experiments. It has since been mounted on a wooden stand and is on exhibit in the Copenhagen Polytechnic Institute.

ARL Fellowship: A Brief History

The ARL Fellowship began under the Laboratory Command (LABCOM). In 1989, Brigadier General Malcolm R. O'Neill, LABCOM Commander, and Mr. Richard Vitali, Director of Corporate Laboratories, conceived the idea of an honorary/advisory body of senior scientists drawn from throughout the command. Patterned after similar organizations—such as the BRL Fellows—which were already in existence in some of the laboratories, the LABCOM Fellowship was to be a semi-independent, peer-elected, self-perpetuating consultative asset to the Commander. The Fellowship quickly proved its value, serving as LABCOM's screening panel for technical competitions such as the Army Science Conference and the R&D Achievement Awards. The organization also drafted and approved its charter, which codified the purposes of the organization and provided a mechanism for the election of new members.

With establishment of ARL, Vitali, now the Acting Director, requested that members of the LABCOM Fellows form the nucleus of an ARL Fellowship. Accordingly, the charter of the LABCOM Fellows was adapted to the new organization. It was approved at the first meeting of the ARL Fellows, December 1, 1992, and was accepted by Dr. John W. Lyons, Director, ARL.

At the December 1 meeting, the ARL Fellowship charted a fairly active course for itself. The organization decided to meet regularly, rotating its meeting sites among the ARL installations. In addition to the technical screenings requested by the Director, the Fellowship also evaluates for ARL awards in technical achievement and publication. The Fellowship, whenever requested, will participate in reviews of the ARL Technical Program.

It is important, therefore, that members of the Fellowship not only represent the highest accomplishments in science, mathematics, engineering, and analysis but also be capable of fulfilling their roles in this active organization.

Finally, as stated in the charter, the Fellowship would also like to be representative of ARL as a whole. To this end, the charter sets forth nomination procedures that assure a field of candidates that is representative of the entire laboratory.

Kwong-Kit Choi

Sensors & Electron Devices Directorate



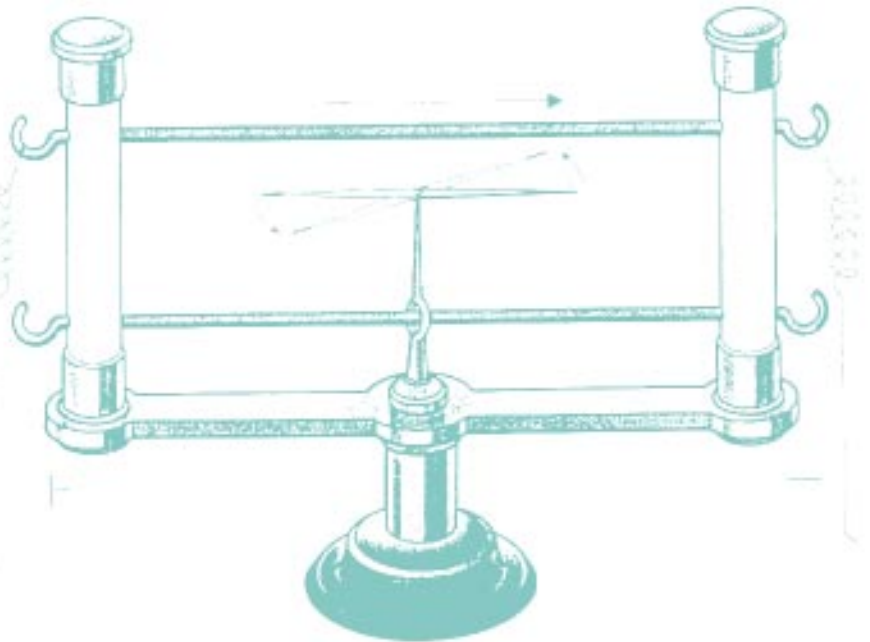
Kwong-Kit Choi graduated from the University of Hong Kong with a B.S. in physics and received his Ph.D. in physics from Yale University (1984). As the co-inventor of the quantum-well infrared photodetector (QWIP) and the inventor of the infrared hot-electron transistor and the corrugated-QWIP, he has made significant contributions to electronic engineering and to basic solid state physics. Before joining ARL in 1988, Choi worked as a research associate at Princeton University and at AT&T Bell Labs. Currently, he is a research scientist in the Sensors and Electron Devices Directorate.

In 1985, Choi discovered the one-dimensional quantum Hall effect. Since then, he has pursued research in such areas as electron localization and many-body interaction. He has developed

several spectroscopy techniques for device characterization, as well as quantum collector transistors for high-speed digital and analog applications. Choi's work on QWIPs forms the foundation of the new infrared technology, and he has produced high-resolution and high-sensitivity QWIP focal plane arrays for night vision and other purposes. The technology also potentially influences aspects of everyday life, including medical diagnostics and traffic safety.

Choi has shared two Army Research and Development

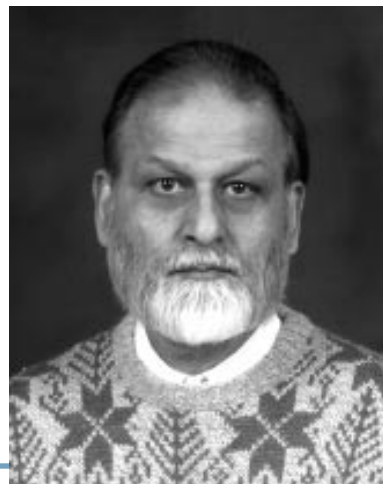
Achievement Awards; one in 1991 for advances in infrared sensing technology and another in 1993 for work on a new hot-electron quantum-well detector. He is the author of *The Physics of Quantum Well Infrared Photodetectors* and the author or coauthor of 62 articles in refereed professional journals and two book chapters. He has been awarded nine patents and has one pending. He has made 37 invited presentations to conferences, academia, industries and various government agencies. He was named an ARL Fellow in 1995.



Ørsted proved that an electric current flowing in the direction of the upper arrow would set up a magnetic field that would cause a compass needle to point to the poles of that field. This was firm evidence—after 200 years of investigation—of the link between electricity and magnetism.

Dattatraya Dandekar

Weapons & Materials Research Directorate



Datta Dandekar, a supervisory research physicist in the Weapons and Materials Research Directorate, is responsible for planning and executing basic and applied research in the field of high strain rate behavior of materials. His recent research focuses on the nonlinear behavior of both physical and mechanical properties of armor and armament materials under dynamic loading and unloading conditions. Results of his work have provided new insight into constraints needed to improve the existing material models for metals and their alloys, as well as ceramics and glasses.

Dandekar received three degrees in India, a B.S. (1954) from Banaras Hindu University, a

master's degree in statistics (1956) from Patna University, and a master's diploma in demography (1961) from the Demographic Research Center. He changed his field of interest to geophysics and received an M.S. (1965) and a Ph.D. (1967) in geophysics from the University of Chicago. He joined the Army Materials and Mechanics Research Center (predecessor to ARL) in 1973.

Dandekar has published 82 research papers and has reviewed books for the American Association for the Advancement of Science. A visiting professor at North Carolina State University in 1982, he helped set up its shock wave facility. He is a member of Sigma Xi, the Ameri-

can Physical Society (APS), and the American Geophysical Union. He served as a member of the National Science Foundation Science and Technology Center Site Review Panel in 1990. In the fall of 1994, Dandekar was named an ARL Fellow. Recently elected vice-chair of the APS Topical Group on Shock Compression of Condensed Matter, he previously chaired its Awards Committee (1993–1995). In 1997, he chaired the Biennial International APS Conference on Shock Compression of Condensed Matter. He was an Adjunct Professor in the Department of Mechanical Engineering at the University of Maryland, Baltimore County during 1996 and 1997.



Robert A. Fifer

Weapons & Materials Research Directorate



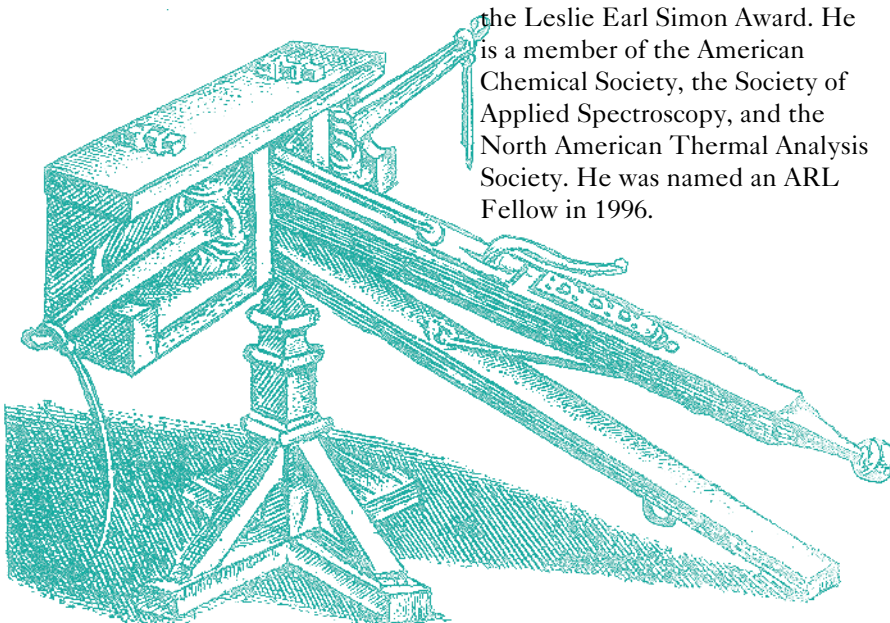
Robert Fifer received his B.S. cum laude in chemistry from Gordon College in 1965 and his Ph.D. in physical chemistry from Temple University in 1969. Following two years of postdoctoral research at Cornell University and a year as research associate at Boston College, he joined the Chemistry Division at the Army's Frankford Arsenal in 1972. In 1977, he came to the Interior Ballistics Division of the Ballistic Research Laboratory (BRL), which later became part of the Weapons and Materials Research Directorate (WMRD).

Fifer is considered an expert in propulsion techniques, solid and liquid propellants, and combustion kinetics. He has authored or coauthored more than 130 technical publications in such areas as high-temperature kinetics in shock tubes, convective burning mechanisms,

hypervelocity propulsion techniques, chemical characterization of propellants, vibrational spectroscopy, pyrolysis mechanisms, thermodynamics, artificial intelligence, supercritical fluid extraction, and self-assembled monolayers. He is credited with developing several new research techniques and for establishing protocols for others that had not previously been applied to materials of Army interest. He proposed the use of layered propellants in gun systems and carried out the first interior ballistic calculations to show what muzzle velocity gains should be achievable with "FastCore" propellant.

Fifer established the Chemical Characterization Team and Laboratory, one of WMRD's major experimental facilities. From 1993 to 1996, he served as Chief of the Ignition and Combustion Branch. He played a major role in bringing environmental research to ARL and, for several years, has served as ARL coordinator of environmental R&D programs. In addition, he serves as ARL Administrator of the National Research Council (NRC) and American Society for Engineering Education (ASEE) postdoctoral programs. During his Army research career, he has mentored over a dozen postdoctoral fellows.

The recipient of many special act and symposium paper awards, Fifer was also a BRL nominee for the Leslie Earl Simon Award. He is a member of the American Chemical Society, the Society of Applied Spectroscopy, and the North American Thermal Analysis Society. He was named an ARL Fellow in 1996.



Among the sophisticated mechanical weapons of the ancient world was a crossbow dating from around 200 B.C. and attributed to Philo of Byzantine.

Gary L. Hagnauer

Weapons & Materials Research Directorate



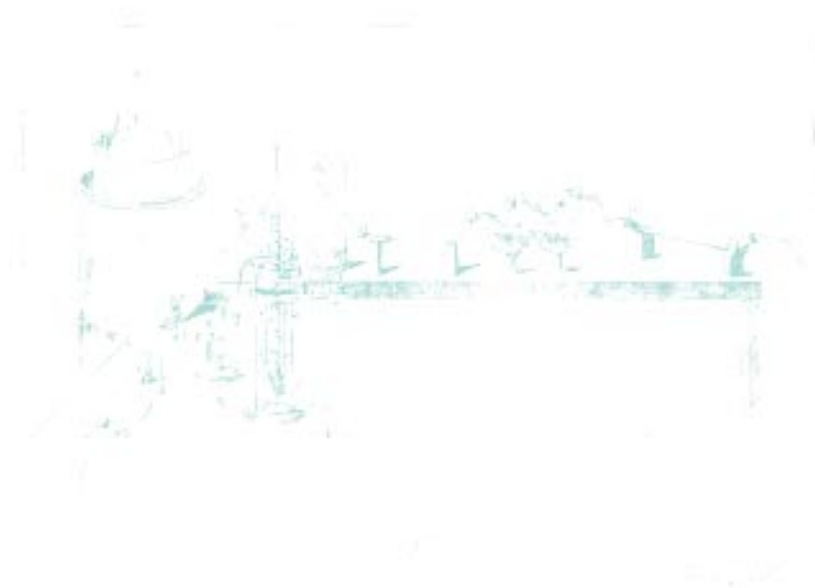
Gary Hagnauer graduated from Southern Illinois University with a B.A. (1965) in chemistry, physics, and mathematics and received his M.S. (1967) and Ph.D. (1970) in physical chemistry from the University of Iowa. He began his professional career as a research chemist in 1969 at the Army Materials and Mechanics Research Center (AMMRC) and advanced to the position of Senior Research Scientist (ST) in 1990. He was a member of the special planning group that formulated the concept and plans that ultimately resulted in the formation of the Army Research Laboratory, and he is now at the new Rodman Materials Research Laboratory at Aberdeen Proving Ground, MD.

Hagnauer's research interests include the synthesis and characterization of novel polymer materials, polymer structure-property studies, and the testing and evaluation of advanced polymers and composite materials. He oversees the ARL Materials 6.1 Research Program; manages or coordinates materials activities in several university and industry programs; and has served on several panels for the The Technical Cooperation Program (TTCP). Currently, he chairs the group developing the joint government/industry Composite Materials Handbook (MIL HDBK-17).

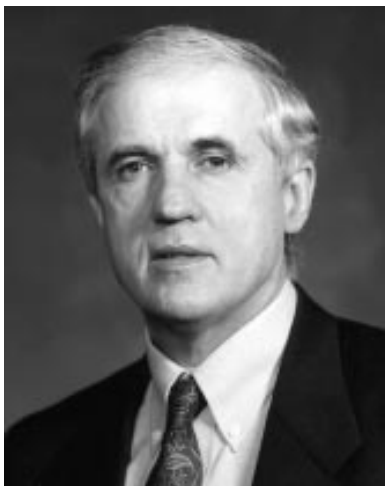
A member of the American Chemical Society, the Society of Plastics Engineers, the Materials Research Society, the American

Society of Testing and Materials (ASTM), and Sigma Xi, Hagnauer also is a Trustee of the American Plastics Institute. He received the AMMRC Director's Award (1975), the Army R&D Achievement Award (1978), TTCP Achievement Awards (1985, 1986), the Commander's Award for Civilian Service (1993), the ASTM Award of Recognition (1993), and the TTCP Meritorious Service Award (1995). He has authored or coauthored over 60 refereed publications and 80 papers published as professional society symposia proceedings or technical reports and has been awarded one patent.

Hagnauer and his wife, Dr. Helen Strieter Hagnauer, have two sons, Paul and Jon.



Lavoisier's apparatus for burning various oils in a measured quantity of oxygen and collecting the products of combustion is depicted in this plate from his *Elements of Chemistry*. Madame Lavoisier approved the plate by writing "Bonne" at lower right.



Kenneth A. Jones

Sensors & Electron Devices Directorate

Ken Jones currently leads the ARL team working on wide bandgap semiconductor devices. He received his B.S. in 1962 as an Alfred P. Sloan National Fellow and his M.S. in engineering science in 1964, both from Dartmouth College. He received his Ph.D. in materials science from MIT in 1968 with the support of a National Science Foundation Fellowship. Jones first worked at the 3M Research Labs, and in 1972, he returned to Dartmouth to teach. Then he joined the faculty at Colorado State University in 1979 and moved to the University of Massachusetts in 1984. In 1987, he joined the Electronics Technology and Devices Laboratory, which later became part of ARL and SEDD. Jones retained his ties to academia by teaching at Rutgers and serving on the physics advisory board for the New Jersey Institute of Technology. He will be teaching at the University of Maryland.

His research primarily involves the science and technology of semiconductor growth and device processing and reliability. Initially, Jones had charge of the molecular beam epitaxy (MBE) facility where he focused on growing high-electron-mobility transistor (HEMT) structures and fabricating devices from them. In a related effort, Jones and a team at Fort Monmouth developed a

method for determining the composition of thin, strained InGaAs layers.

Jones was a member of the Advanced Research Projects Agency/Tri-Service Reliance Microwave/Millimeter-wave Monolithic Integrated Circuits (MIMIC) Epitaxial Characterization Team. More recently, that group was reassembled to characterize wide bandgap semiconductor materials, and Jones is also active in programs at the University of Maryland and Johns Hopkins. During an APEX sabbatical in 1995, Jones worked

at the Defense Research Agency (U.K.) and at the Cavendish Laboratory at Cambridge.

Jones received the Army R&D Achievement Award in 1993 and 1996. He has 85 refereed journal publications, 102 conference presentations, 4 patents, and he is the author of *Introduction to Optical Electronics* (Harper & Row, 1987). He is a senior member of the IEEE and a member of the Electrochemical Society, Metallurgical Society, and the American Society of Crystal Growth. He is also a member of the Phi Lambda Mu and Sigma Xi honorary societies.

A sixteenth century engraving shows the two main calculating methods. The female figure represents Arithmetic. On her left, Pythagoras uses a counting board—a kind of abacus—on which he has formed the numbers 1241 and 82. On Arithmetic's right, Boethius uses Arabic (in fact, Indian) numerals. Medieval scholars wrongly thought that the two men invented these methods.



J. Terrence Klopchic

Survivability/Lethality Analysis Directorate

Terry Klopchic received a B.A. in physics from Knox College in Illinois and a Ph.D. in physics from the University of Notre Dame. Subsequently, he served in the U.S. Army Chemical Corps and was assigned to the Ballistic Research Laboratory. Currently, he is the Senior Scientist of the Ballistics and Nuclear, Biological, and Chemical (NBC) Division of SLAD.

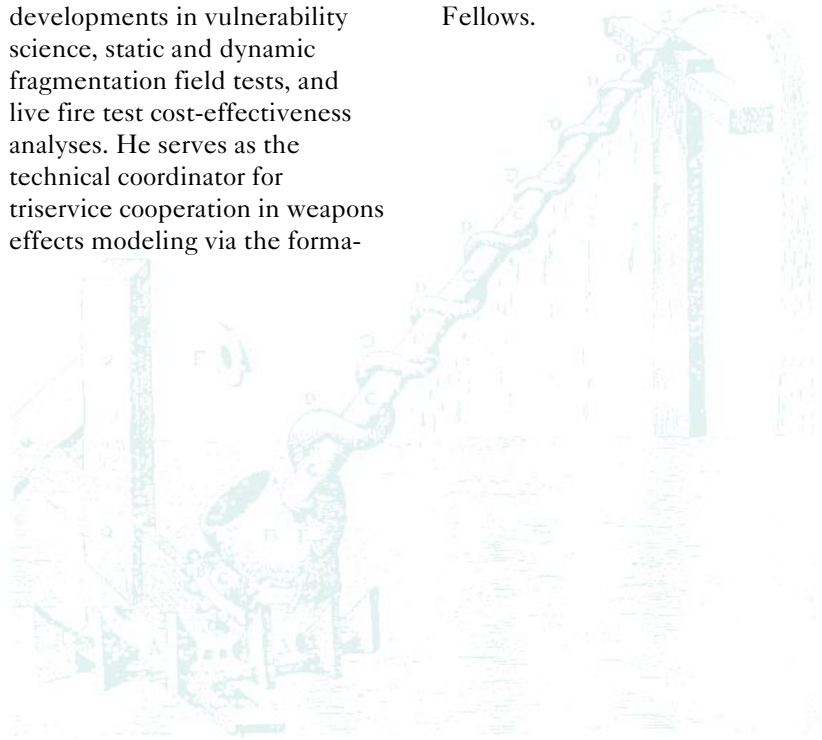
Klopchic has made significant contributions to the development of nuclear instrumentation, directed-energy experimentation and analysis, unit (company/battalion) effectiveness and resiliency simulation, and computer modeling of battlefield factors including personnel effects such as performance degradation in toxic environments, fatigue, heat stress, and neuro-psychological casualty occurrence. Through advanced computer simulations, he created unit-level weapon effects models in conventional, nuclear, and chemical scenarios. Several methodologies developed by Dr. Klopchic in the 1970s are still in use today.

Klopchic has served as a member of the Defense Nuclear Agency Intermediate Nuclear Dose Panel, U.S. Army Nuclear and Chemical Agency's Nuclear Biological Chemical Survivability Secretariat, Army chair of the Joint Technical Coordinating

Group for Munitions Effectiveness (JTCEG/ME) - Vulnerability Group, organizer and chair of the JTCEG/ME and /AS (Aircraft Survivability) Crew Casualty Working Group, and technical coordinator of the OSD Target Interaction Lethality Vulnerability (TILV) thrust. He performed duties as the Army's chief scientist in the response to radiological hazards from nuclear weapon accidents and supported the Navy operational test and evaluation field tests of the Bigeye chemical bomb. He has conducted special OSD-directed projects such as theoretical developments in vulnerability science, static and dynamic fragmentation field tests, and live fire test cost-effectiveness analyses. He serves as the technical coordinator for triservice cooperation in weapons effects modeling via the forma-

tion of algorithm-level libraries, maintenance of the triservice vulnerability support contract, and also serves as the focal point for triservice cooperative developments in technical areas such as in blast and shock modeling.

Klopchic has received Army R&D Achievement Awards and System Analysis Awards and the BRL R.H. Kent Award. He was elected to Phi Beta Kappa in 1964. He has authored more than 80 technical reports and holds one patent. He and Dr. Art Ballato served as the co-chairs of the LABCOM Fellows and the founding co-chairs of the ARL Fellows.



Archimedes is perhaps best known for the Archimedean screw, although there is some doubt as to whether he did in fact invent the device. Regardless of its inventor, it was still in wide use after 2000 years, when this early seventeenth-century illustration was produced.

Richard P. Leavitt

Sensors & Electron Devices Directorate



Leavitt is a physicist in SEDD who performs theoretical and experimental research on the properties of ultra-thin-layered III-V semiconductor structures. He received his B.S. degree in physics from Lowell Technological Institute in 1970 and the Ph.D. in physics from the University of Lowell (now the University of Massachusetts at Lowell) in 1976.

Leavitt joined Harry Diamond Laboratories (HDL) in 1970, working in many areas of theoretical and experimental physics research, including ferroelectrics, generation of high magnetic fields, high-pressure physics, theory of impurity-ion spectra in solids, and theory of phase transitions. In 1974, he joined AVCO Everett Research Laboratory where he worked on his thesis topic as well as laser isotope separation. In 1976, he returned to HDL, where he continued his work on collision

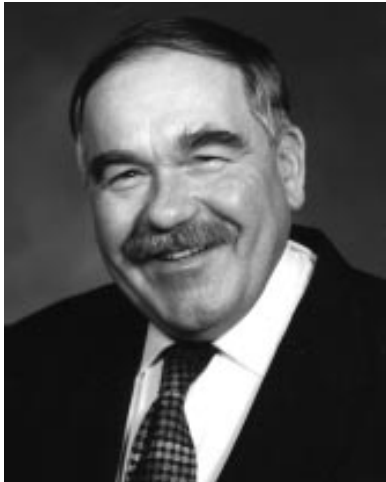
broadening of molecular spectra and resumed his work on impurity-ion spectra in solids. He also played an essential role in developing the West's first orotron, a highly coherent source of millimeter-wave radiation.

Leavitt started his work in semiconductor physics and devices shortly before he left HDL in 1985 to join Martin Marietta Laboratories, where he performed seminal work in the development of semiconductor asymmetric coupled quantum wells for optical modulator applications. Returning to HDL in 1989, he continued to work extensively on the basic physics and optoelectronic applications of semiconductor quantum-well and superlattice structures. He has developed an advanced theoretical formalism for predicting the electronic structure and optical properties of complex quantum-well and superlattice structures, and his pioneering work on molecular beam epitaxial growth of (In,Ga)As/(In,Al)As multiple-quantum-well structures on InP substrates has resulted in material with state-of-the-art structural and optical properties.

The holder of eight patents, Leavitt has authored or coauthored more than 100 publications in refereed scientific journals. He was named an ARL Fellow in 1995.

Herbert A. Leupold

Sensors & Electron Devices Directorate



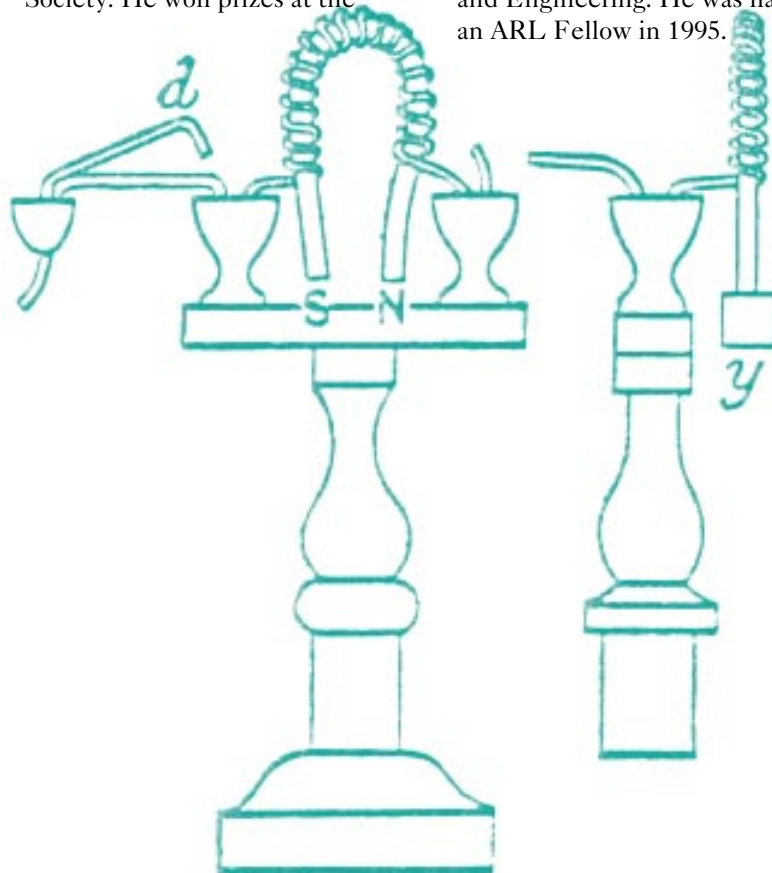
electron beam focusing devices, and electromechanical devices and in research on deep-level semiconductors. He holds 92 patents in the field of magnetics and has authored or coauthored more than 250 scientific journal articles and conference presentations. He has also written 46 technical reports.

A Fellow of the IEEE, Leupold is a member of the American Physics Society, Sigma XI, and the IEEE Magnetism Society. He won prizes at the

Army Science Conference in 1974, 1984, and 1990 and the Stiple Award in 1996 and shared Army Research and Development Achievement Awards in 1983, 1988, and 1995. He has also received the Harold Jacobs Award (1987) from the Electronics Technology and Devices Laboratory. In 1995, he presented a command briefing on ARL's research in permanent magnets to the Secretary of Defense and the Director of Defense Research and Engineering. He was named an ARL Fellow in 1995.

Herb Leupold, a senior research physicist in the Sensors and Electron Devices Directorate, is currently a visiting scientist in the Physics Department at West Point. He served two years in the U.S. Army Signal Corps at Fort Monmouth, NJ, after studying at Queens College (NY), receiving his B.S. in 1953. He went on to receive an M.A. (1958) and a Ph.D. (1964) in physics from Columbia University. Leupold served a postdoctoral fellowship at Lawrence Livermore National Laboratory (1964-1967) before joining the Institute for Exploratory Research at Fort Monmouth (a predecessor to SEDD) in 1967.

Leupold is involved in the study and development of permanent magnet structures for magnetic resonance imagers,



Front and side views of Sturgeon's electromagnet, the first to be invented (1825).

James W. McCauley

Weapons & Materials Research Directorate

James W. McCauley is the Senior Research Engineer in Ceramic Materials in the Weapons and Materials Research Directorate.

McCauley earned his B.S. cum laude in geology from St. Joseph's College (Indiana) in 1961 and his M.S. in mineralogy in 1965 and Ph.D. in solid state science in 1968 from The Pennsylvania State University. He was employed at the Army Materials Technology Laboratory for 22 years, serving as Chief of the Materials Characterization and Materials Science Divisions for the last 10 years there. He also served as adjunct professor at Boston University. From 1990 through 1994, he served as Dean of the New York State College of Ceramics at Alfred University. Then from January 1995 to June 1996, he was a Professor of

Ceramic Engineering at the same institution.

McCauley, who holds three patents, is the author or coauthor of more than 90 open-literature publications and reports and the editor or co-editor of four books. He received the Army R&D Achievement Award in 1981 and again in 1983; he has served on the Army Science Board; and he is currently serving on the external review committee for the Materials Science and Technology Division of Los Alamos National Laboratory. He is also an Honor Professor at Jingdezhen Ceramic Institute, China.

A Fellow and past Vice President and Treasurer of the American Ceramic Society, McCauley is a past Chair and past Trustee of the Engineering Ceramics Division, past Trustee of the Ceramic Educational



Council, past Chair of the New England Section, and a co-founder of the Cocoa Beach Conferences. Currently, he is President of the Society. He is also the winner of the F. H. Norton award from the New England Section and James I. Mueller award from the Engineering Ceramics Division of the Society.



A da Vinci drawing of a covered armored car. The ingenious elaboration of various war machines, like this surprising covered car, the ancestor of the modern tank, is followed by Leonardo's description of its function and tactical use.

James M. McGarrity

Sensors & Electron Devices Directorate



Jim McGarrity is the Senior Research Scientist in Electronics Survivability in the Sensors and Electron Devices Directorate. He joined the Diamond Ordnance Fuze Laboratories (DOFL) in 1961 as the nuclear reactor physicist at the Diamond Ordnance Radiation Facility (DORF). For more than 30 years, he has investigated the effects of radiation on semiconductor electronics and explored means to mitigate against these effects. Since 1991, McGarrity has conducted research on SiC wide bandgap semiconductor devices for high-power, high-temperature, and high-frequency electronics for future combat systems.

In 1958, McGarrity graduated from St. Joseph's University and received an Atomic Energy Commission Special Fellowship in Nuclear Science and Engineering for study at the University of Maryland. In 1969, he earned his Ph.D. in nuclear engineering from Maryland.

For 15 years, McGarrity served as program area reviewer for the Defense Nuclear Agency (DNA), advising them on key technical issues. He was one of the original organizers of the DNA/Sandia National Laboratory classified HEART Conference, and he has held several offices in the Radiation Effects Technical Committee of the IEEE Nuclear and Plasma Sciences Society

(NPSS). From 1986 to 1992, he served on the NPSS Fellows Committee.

McGarrity has authored or coauthored 50 papers and has been awarded one patent. In 1979, he received the HDL Wilbur S. Hinman Award for Technical Achievement. In 1985,

he was named a Fellow of the IEEE for his contributions to the understanding of the physical mechanisms producing radiation damage in metal oxide semiconductor (MOS) devices. He was named an ARL Fellow in 1994.

The Greeks developed many geometrical techniques, and this medieval illustration shows some of their practical applications, including making astronomical observations, measuring the Earth, surveying and building. But the West lost its full knowledge of Greek geometry in the Dark Ages and had to regain it via Arab scholars in southern Spain.



T. Kevin O'Brien

Vehicle Technology Center

Kevin O'Brien is a Senior Research Scientist with the Vehicle Technology Center (VTC) co-located at the NASA Langley Research Center in Hampton, Virginia. An international authority on composite delamination and fatigue, he has developed test methodology for application to toughened epoxy and thermoplastic matrix composites and delamination failure criteria for static and cyclic loading. His research has contributed directly to the development of new design methods for rotorcraft and to the improvement of advanced composite materials. He is frequently invited to consult on major U.S. government projects, conduct failure analyses, organize and chair symposia, present papers reviewing the state of the composite fatigue and fracture technology, and represent the U.S. Army in international research programs.

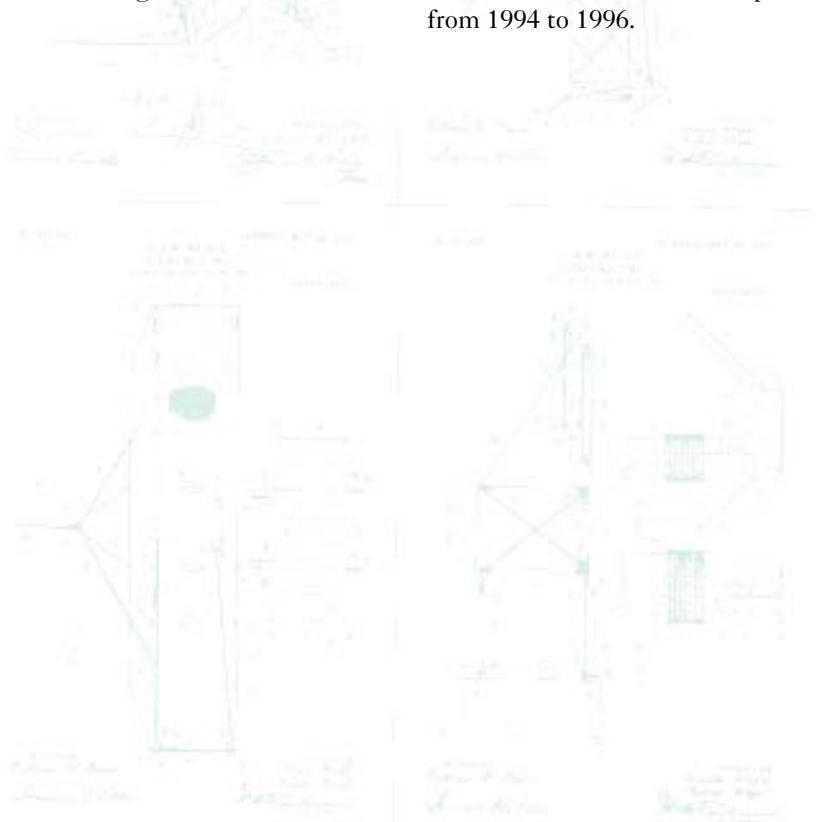
O'Brien joined the Langley Research Center in October 1978 after completing a Ph.D. in Mechanics and Materials at the Virginia Polytechnic Institute in Blacksburg. He has over 100 publications and presentations in his research area and has been the principal investigator for several Cooperative Research and Development Agreements (CRDAs) with the rotorcraft and ground vehicle industry.

O'Brien is a member of the executive committee of American

Society for Testing and Materials (ASTM) Committee D30 on Composites. He currently chairs the ASTM D30.06 Subcommittee on Interlaminar Properties and has led the efforts to develop international standards for measuring interlaminar fracture toughness. In addition to his committee activity, O'Brien has served as a co-editor of the ASTM Journal of Composites Technology and Research and has chaired two ASTM symposia: Long Term Behavior of Composites and Fatigue and Fracture of

Composites. He has also served on the organizing committee for the American Society for Composites (ASC) and the editorial boards of the Journal of Applied Composite Materials and the International Journal of Fatigue.

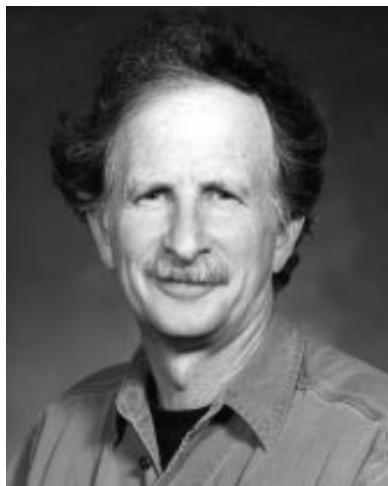
In addition to his government duties, O'Brien is an adjunct professor with the George Washington University (GWU) Joint Institute for Aeronautical and Flight Sciences at NASA Langley. O'Brien was elected as an ARL Fellow in July of 1993 and co-chaired the Fellowship from 1994 to 1996.



Detail from the patent granted May 22, 1906, to Orville and Wilbur Wright, the first patent ever granted on a practical airplane.

Ronald G. Pinnick

Information Science & Technology Directorate



Pinnick's interest in physics began as a teenager when he drove tractors on his uncle's farm near Billings, Montana. He received B.S. (1964) and M.S. (1966) degrees from the University of Wisconsin, Madison, and a Ph.D. (1972) in physics from the University of Wyoming. He worked on nuclear test reactors at the National Reactor Test Station

in Idaho, held a visiting appointment at the National Center for Atmospheric Research in Boulder, and joined ARL (Atmospheric Sciences Laboratory) in 1975.

In his recent research, Pinnick has focused on the areas of nonlinear optics in microdroplets, optical techniques for measuring biological aerosols, scattering characteristics of irregular and inhomogeneous microparticles, and measurement of physio-chemical properties of atmospheric aerosols. He helped develop a method capable of rapid measurement of fluorescence spectra of single bioaerosol microparticles and a fluorescence-based sensor capable of differentiating bioaerosol particles from most nonbiological atmospheric aerosol particles. Jointly with collaborators, he made some of the early measurements of aerosol-induced laser breakdown thresholds in the ultraviolet and

observed evaporative surface instabilities in laser-irradiated microdroplets. With colleagues, he established that acid sulfates dominate the atmospheric aerosol burden in the arid southwestern United States and determined that the mass concentration frequency-of-occurrence of the aerosol is lognormally distributed.

Pinnick has coauthored 75 publications and about 1000 citations in aerosol science, optics, atmospheric science, and geophysics journals. He has served as advisor to nine National Research Council research associates, four of whom have been hired by ARL. Pinnick has a granddaughter living in Wetmore, Colorado.



A chart of the trade winds made in about 1730.



Edward H. Poindexter

Sensors & Electron Devices Directorate

Edward Poindexter received his B.S. (1952), M.S. (1953), and Ph.D. (1956) from the University of Michigan, where he specialized in materials science. Dr. Poindexter is known for his studies of dynamic nuclear polarization or low-frequency maser action in free-radical systems, and more recently, for determination of the origin and nature of the most important atomic-scale defects in silicon/silicon-dioxide structures. The Si/SiO₂ structure is the critical element in the pervasive metal-oxide-silicon (MOS) transistor of modern ultra-large-scale integrated (ULSI) circuits. His findings triggered a new, world-wide generation of solidly founded research on the modeling and improving of the fabrication, performance, and reliability of MOS for ULSI. ULSI circuits are the “brains” of many major Army electronic systems. Dr. Poindexter has published or presented more than 300 papers, and is widely cited. He has received well over 100 invitations in the U.S. and abroad to present or publish in conferences, institutional seminars, review papers, and books. In 1996, he was an invited guest and participant in the annual physics symposium of the Nobel Foundation in Sweden. He is a Fellow of the Mineralogical Society of America and the American Physical Society.

Robert Boyle's air pump. Boyle stands out among seventeenth-century natural philosophers as a careful observer and investigator. Particularly in pneumatics and chemistry, his experiments laid a firm groundwork for much that was to follow.

G. Richard Price

Human Research & Engineering Directorate



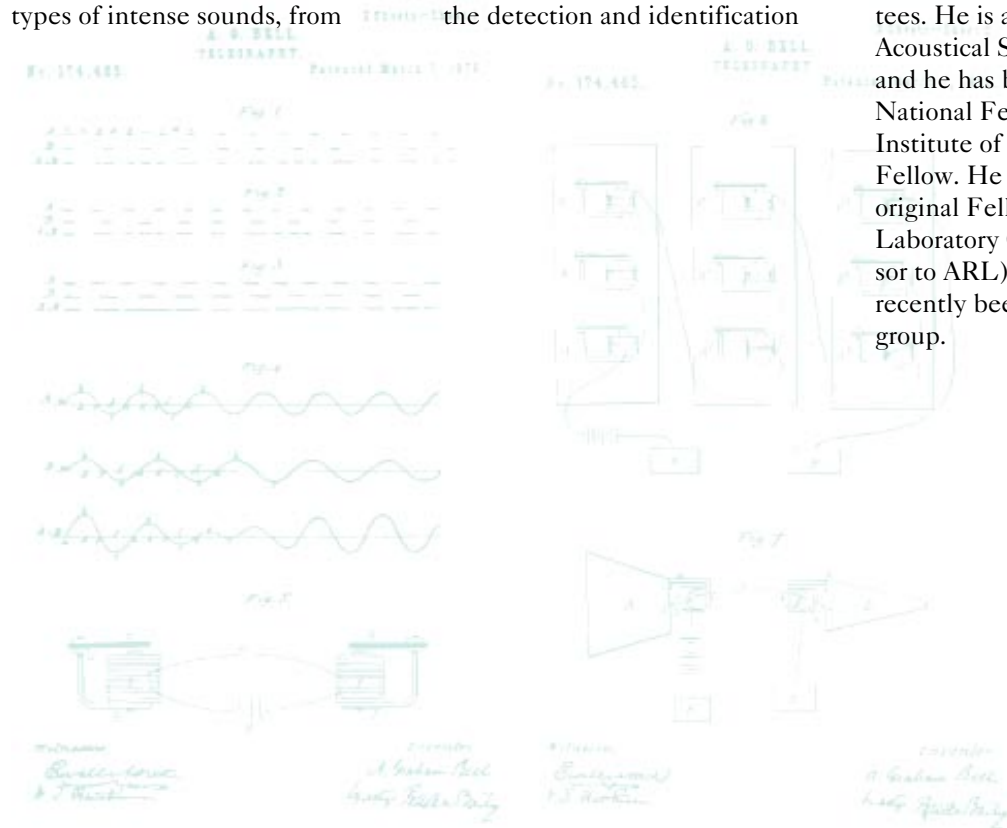
Richard Price is currently a Senior Research Scientist in the Human Research and Engineering Directorate. He received a B.S. in psychology from the University of Delaware in 1960 and a Ph.D. in psychology from Princeton University in 1963.

His research in audition has produced an understanding of the mechanisms of hearing loss from intense sounds and has led to a mathematical model of their effect on the ear. The model predicts hearing loss from all types of intense sounds, from

cannons to automobile airbags. It also furnishes visualizations of inner ear motion, providing engineering insight into the actions of the stimulus and suggesting novel methods of ameliorating hazard through design of the sources, barriers, or new types of hearing protection. Moreover, it is the basis for the development of an international damage-risk criterion for noise. Price has also initiated programs quantifying and predicting the effect of changes in hearing on soldier performance, to include the detection and identification

of sounds, as well as the effect on crew and system performance. Price's research team has also modeled the processes associated with the propagation, detection, and identification of sounds. This work impacts the development of improved target detection capabilities, as well as acoustic camouflage. This model is the basis for the Army's nondetectability criterion.

Price serves on technical committees in the National Academy of Science and NATO and on ANSI standards committees. He is a Fellow of the Acoustical Society of America, and he has been a Princeton National Fellow and a National Institute of Mental Health Fellow. He was named one of the original Fellows of the U.S. Army Laboratory Command (predecessor to ARL) in 1989, and he has recently been co-chair of the group.



A copy of the original patent for the telephone; considered by many to be the most valuable patent ever issued.

Edward M. Schmidt

Weapons & Materials Research Directorate



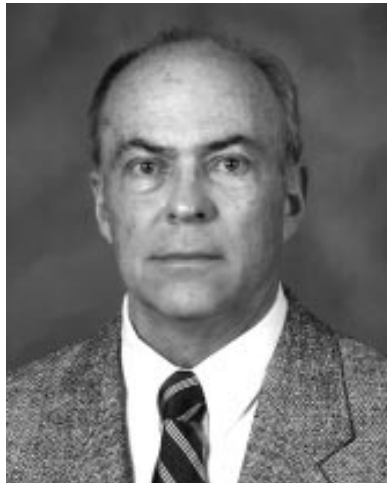
Edward Schmidt has worked for the U.S. Army for 29 years, including two years on active duty. He received his B.S. (1964), M.S. (1965), and Ph.D. in aeronautical engineering (1969) from the Polytechnic Institute of Brooklyn. Following completion of his doctorate, Schmidt entered the Army as a Captain and worked on what is now the Blackhawk helicopter. In 1971, he joined the Ballistic Research Laboratory where he became chief of the Fluid Physics Branch and, later, chief of the Aerodynamics Branch. He is now manager of the electric armaments program for ARL.

Schmidt has published more than 100 technical papers and reports, and he holds five patents. His professional interests include the aerodynamics of projectiles and weapon systems, unsteady flow phenomena, weapon accuracy, and aeroballistics, as well as electric armaments. He has been the U.S. team leader on several multinational working groups, and he is a member of the International Ballistics Committee. Since 1980, Schmidt has been a postdoctoral advisor to National Research Council Associates.

Elected an ARL Fellow in 1997, Schmidt is an associate fellow of the American Institute of Aeronautics and Astronautics (1980), and he was a BRL Fellow (1982). His awards include two Army Research and Development Achievement Awards (1978 and 1989) and a Meritorious Civilian Service Award (1985).

Walter B. Sturek, Sr.

Corporate Information & Computing Center



Walt Sturek received his B.S. in mechanical engineering from Oklahoma State University in 1960, an M.S. from MIT in 1961, and a Ph.D. in applied science from the University of Delaware in 1971. He currently is a physical scientist in the Research Projects Office of the High-Performance Computing Division. Sturek's personal research focuses on establishing high-performance computing technology for physical modeling applications in computational fluid dynamics, and he is also the

Contracting Officer's Representative for the Army High-Performance Computing Research Center (AHPCRC), in Minneapolis.

Sturek has published more than 90 research papers and technical reports. He has reviewed papers for the American Institute of Aeronautics and Astronautics (AIAA) Journal, the AIAA Journal of Spacecraft and Rockets, and the AIAA Journal of Aircraft, and he has served as Associate Technical Editor for the AIAA Journal of Spacecraft and Rockets. Sturek was elected a BRL Fellow (1978) and has received the AIAA Baltimore Section Engineer of the Year Award (1980), the Meritorious Civilian Service Award (1983), two Army Research and Development Achievement Awards (1979 and 1983), BRL's R.H. Kent Award (1985), and awards for papers presented at the Army Science Conferences (1982, 1988, and 1996).

Sturek is internationally known for his pioneering experimental and computational research to establish the capability to predict the Magnus effect for a spinning shell. He has published extensively in the areas of supersonic projectile aerodynamics, heat transfer, compressible turbulent boundary-layer development, and boundary-layer transition.



Gunners calculating the elevation of their artillery. The man on the right is working out the height of the target, while his colleague uses a quadrant to set the cannon. The plumb line shows the angle of elevation, which is altered by inserting or removing wooden pegs and wedges under the barrel.

Don J. Torrieri

Information Science & Technology Directorate



Don Torrieri is a leading Army expert in communication systems, adaptive arrays, and signal processing. He has done extensive research in the design of algorithms for interference suppression and the super-resolution of received signals arriving from nearly the same direction. His past assignments have included assessment of the survivability of Army communication and electronic warfare systems and development of system enhancements. This work entailed extensive mathematical analyses in the areas of interference and jamming suppression, modulation, error-correcting codes, direct-sequence systems, frequency-hopping systems, adaptive arrays, interception, direction finding, and position fixing.

Torrieri received a Ph.D. in electrical engineering from the University of Maryland in 1971. He previously received an M.S. degree in physics from the University of Maryland, an M.S. degree in electrophysics from the Polytechnic University, and a B.S. degree in electrical engineering from the Massachusetts Institute of Technology. Torrieri analyzed electronic systems at the Naval Research Laboratory, and since 1977, he has worked for the Army.

The author of *Principles of Secure Communication Systems* (1985 and 1992), *Principles of Military Communication Systems* (1981), and chapter one of

Acousto-Optic Signal Processing Theory and Implementation (Marcel Dekker, 1983 and 1995), Torrieri has also written many journal articles, conference papers, technical reports, and classified reports.

In 1989, Torrieri was selected as one of the original Fellows of the U.S. Army Laboratory Command, predecessor to ARL. His awards include the Best Paper Award of the 1991 IEEE Military Communications Conference. He teaches graduate courses at Johns Hopkins University and has taught graduate courses at George Washington University as well as many short courses.

Thomas W. Wright

Weapons & Materials Research Directorate



Tim Wright is a Senior Research Scientist in the Weapons and Materials Research Directorate. He has been an adjunct professor and lecturer at Johns Hopkins University and was a visiting scholar at Oxford University and Cambridge University.

Wright received his Bachelor of Civil Engineering (1956), his MCE (1957), and his Ph.D. in mechanics and applied mathematics (1964) from Cornell University. He was an assistant professor of mechanics at John Hopkins from 1964 to 1967. Then, from 1967

through 1990, he was a mechanical engineer at the Ballistic Research Laboratory, becoming chief of the Solid Mechanics Branch.

Wright's publications include more than 35 government reports and 55 open-literature reports. He has specialized in the areas of nonlinear wave propagation in solids, penetration mechanisms, and materials instability.

A member of Tau Beta Pi, Sigma Xi, Chi Epsilon, Phi Kappa Phi, and the Society for Natural Philosophy, Wright was elected to

the board of directors of the Society for Engineering Science in 1988. He is a Fellow of the American Society of Mechanical Engineers (1990) and of the American Academy of Mechanics (1995).

He has been on the editorial board of the International Journal of Plasticity since 1993.

Wright has received the Secretary of the Army's Research and Study Fellowship twice and both the Presidential Citation and Official Commendation (1977).

The ARL Fellows

Dr. Kwong-Kit Choi

Sensors and Electron Devices Directorate
ATTN: AMSRL-SE-EM
2800 Powder Mill Road
Adelphi, MD 20783-1197
Comm: (301) 394-0495; DSN: 290-0495;
Fax: (301) 394-1746; email: kchoi@arl.mil

Dr. Dattatraya Dandekar

Weapons and Materials Research Directorate
ATTN: AMSRL-WM-TD
Aberdeen Proving Ground, MD 21005-5069
Comm: (410) 306-0801; DSN: 458-0801;
Fax: (410) 306-0783; email: ddandek@arl.mil

Dr. Robert A. Fifer

Weapons and Materials Research Directorate
ATTN: AMSRL-WM-PC
Aberdeen Proving Ground, MD 21005-5066
Comm: (410) 278-6133; DSN: 298-6133;
Fax: (410) 278-6165; email: fifer@arl.mil

Dr. Gary L. Hagnauer

Weapons and Materials Research Directorate
ATTN: AMSRL-WM-M
Aberdeen Proving Ground, MD 21005-5069
Comm: (410) 306-0710; DSN: 458-0710
Fax: (410) 306-0676; email: ghagnau@arl.mil

Dr. Kenneth A. Jones

Sensors and Electron Devices Directorate
ATTN: AMSRL-SE-RL
2800 Powder Mill Road
Adelphi, MD 20783-1197
Comm: (301) 394-2005; DSN: 290-2005;
Fax: (301) 394-4562; email: kjones@emh3.arl.mil

Dr. J. Terrence Klopchic

Survivability/Lethality Analysis Directorate
ATTN: AMSRL-SL-BE
Aberdeen Proving Ground, MD 21005-5068
Comm: (410) 278-6322; DSN: 298-6322;
Fax: (410) 278-6852; email: klopchic@arl.mil

Dr. Richard P. Leavitt

Sensors and Electron Devices Directorate
ATTN: AMSRL-SE-EM
2800 Powder Mill Road
Adelphi, MD 20783-1197
Comm: (301) 394-5750; DSN: 290-5750;
Fax: (301) 394-2103; email: richl@arl.mil

Dr. Herbert A. Leupold

Visiting Scientist
Physics Dept., Room 300, Bartlett Hall
U.S. Military Academy
West Point, NY 10996
Comm: (914) 938-5800; Fax: (914) 938-5803
email: hH3416@exmail.usma.edu

Dr. James W. McCauley

Weapons and Materials Research Directorate
ATTN: AMSRL-WM-M
Aberdeen Proving Ground, MD 21005-5069
Comm: (410) 306-0711; DSN: 458-0711;
Fax: (410) 306-0736; email: mccauley@arl.mil

Dr. James M. McGarrity

Sensors and Electron Devices Directorate
ATTN: AMSRL-SE
2800 Powder Mill Road
Adelphi, MD 20783-1197
Comm: (301) 394-3828; DSN: 290-3828;
Fax: (301) 394-4576
email: jmcgarrit@arl.mil

Dr. T. Kevin O'Brien

Vehicle Technology Center
MS188E
NASA Langley Research Center
Hampton, VA 23681-0001
Comm: (757) 864-3465;
Fax: (757) 864-8911;
email: t.k.obrien@larc.nasa.gov

Dr. Ronald G. Pinnick

Information Science and Technology Directorate
ATTN: AMSRL-IS-EE
2800 Powder Mill Road
Adelphi, MD 20783-1197
Comm: (301) 394-2052; DSN: 290-2052;
Fax: (301) 394-4797; email: rpinnick@arl.mil

Dr. Edward H. Poindexter

Sensors and Electron Devices Directorate
ATTN: AMSRL-SE
2800 Powder Mill Road
Adelphi, MD 20783-1197
Comm: (301) 394-2052; DSN: 290-2052;
Fax: (301) 394-1318; email: epoindexter@arl.mil

Dr. G. Richard Price

Human Research and Engineering Directorate
ATTN: AMSRL-HR-SD
Aberdeen Proving Ground, MD 21005-5425
Comm: (410) 278-5976; DSN: 298-5976;
Fax: (410) 278-3587; email: dprice@arl.mil

Dr. Edward M. Schmidt

Weapons and Materials Research Directorate
ATTN: AMSRL-WM-BE
Aberdeen Proving Ground, MD 21005-5066
Comm: (410) 278-3786; DSN: 298-3786;
Fax: (410) 278-6094; email: schmidt@arl.mil

Dr. Walter B. Sturek, Sr.

Corporate Information and Computing Center
ATTN: AMSRL-CI-HA
Aberdeen Proving Ground, MD 21005-5067
Comm: (410) 278-4712; DSN: 298-4712;
Fax: (410) 278-9432; email: sturek@arl.mil

Dr. Don J. Torrieri

Information Science and Technology Directorate
ATTN: AMSRL-IS-TA
2800 Powder Mill Road
Adelphi, MD 20783-1197
Comm: (301) 394-2484; DSN: 290-2484;
Fax: (301) 394-3591; email: dtorr@arl.mil

Dr. Thomas W. Wright

Weapons and Materials Research Directorate
ATTN: AMSRL-WM-T
Aberdeen Proving Ground, MD 21005-5066
Comm: (410) 278-6046; DSN: 298-6046;
Fax: (410) 278-6952; email: tww@arl.mil

Fellows Emeriti

Arthur Ballato

Time and Frequency, Electro-Physics, and Crystal Physics

Norman J. Berg (deceased)

Acousto-Optics

Harold Breaux

High-Performance Computing

Carl J. Campagnuolo

Nonchemical Energy Conversion

Mitra Dutta

Microelectronics

Donald Eccleshall

Advanced Survivability Techniques

Georges R. Garinther

Acoustics and Human Performance

Gerald Iafrate

Physical and Engineering Sciences

Clarence W. Kitchens, Jr.

Fluid and Blast Dynamics

F. Barry McLean

Radiation Effects on Electronic Materials

Donald R. Messier

Structural Materials (Ceramics)

Clyde A. Morrison

Advanced Electronics and Electronics Materials (Crystal Field Theory)

Charles H. Murphy

Aeronautics and Missile Dynamics

Joseph P. Sattler (deceased)

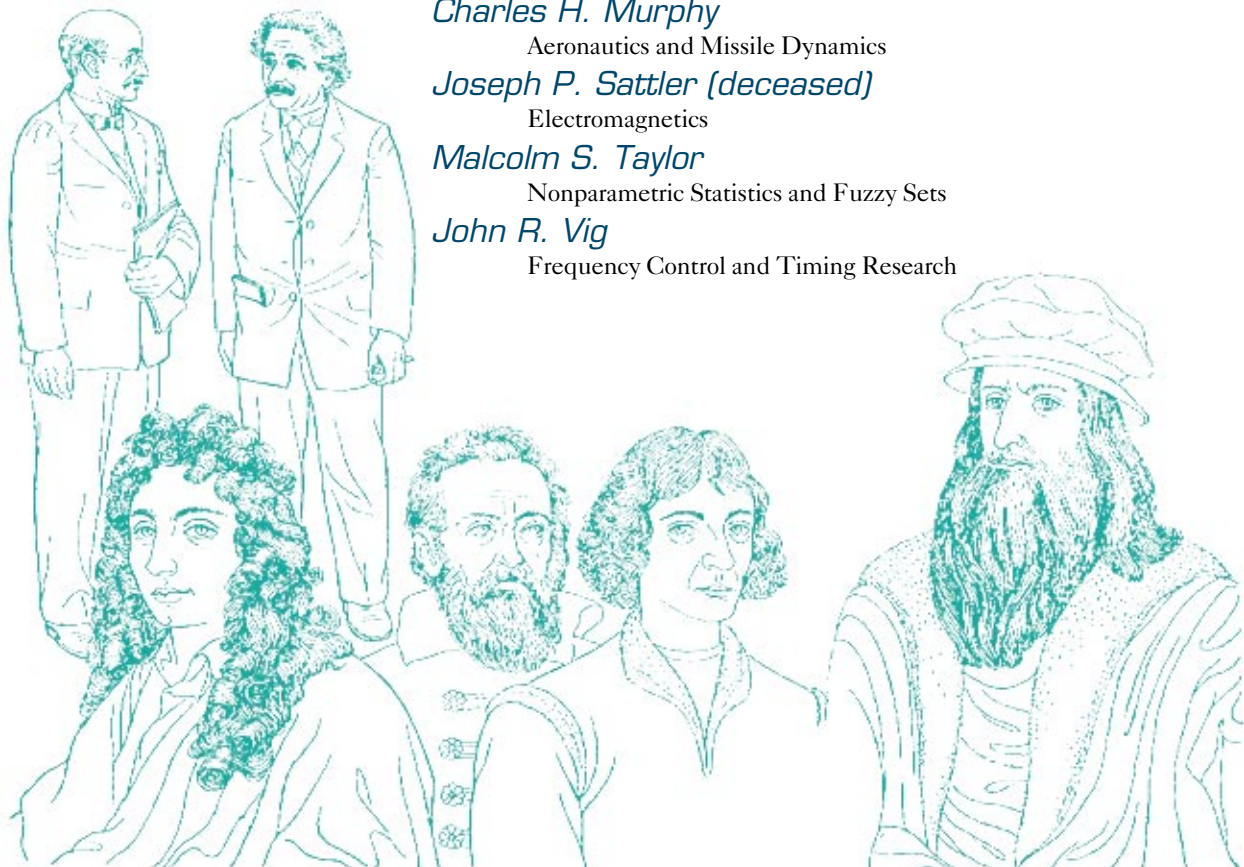
Electromagnetics

Malcolm S. Taylor

Nonparametric Statistics and Fuzzy Sets

John R. Vig

Frequency Control and Timing Research



Six of the world's great scientists are depicted in this drawing. Top row, left to right, are Max Planck and Albert Einstein. Bottom row, left to right, are Christiaan Huygens, Galileo Galilei, Nicolaus Copernicus, and Leonardo da Vinci.